siderable service. Practically all one can say to a traveller is that he should collect full information about everything, and books of this kind are valuable in suggesting topics for inquiry.

Catalogue of the Lepidoptera Phalaenae in the British Museum. Vol. iv. Catalogue of the Noctuidæ in the Collection of the British Museum. By Sir George F. Hampson, Bart. Pp. xx+689, plates lv.–lxxvii., and 125 woodcuts. (London: Printed by Order of the Trustees.) Price 15*s.*; plates 16*s.*

THE previous volumes of this important work appeared in 1898, 1900, and 1901 respectively, and we have now to record the publication of vol. iv., which includes the Agrotinæ, the first of the fifteen subfamilies into which the great family of Noctuidæ is divided; 1139 Agrotinæ are described in the present volume, out of the 10,000 to 12,000 known species of Noctuidæ.

As the Agrotinæ are well represented in Europe and North America, this volume will perhaps appeal to a larger number of lepidopterists than its predecessors, which treated of more showy, but principally tropical, moths. For the plates of Agrotinæ trichromatic photography has been employed, as more suitable to represent the generally dull colours of the Noctuidæ than chromolithography, which is considered better adapted to bright coloured moths, such as Arctiadæ.

Most of the leading lepidopterists of Europe and America have helped to make Sir George Hampson's work more complete by the contribution of specimens, or coloured photographs of unique types, and the loan of co-types.

Descriptions of the known larvæ of Agrotinæ are added from various authentic sources, those of North American species being mostly contributed by Dr. Harrison G. Dyar.

The general arrangement of the book is in all respects similar to that of previous volumes, and the execution of the plates is excellent, though one or two figures may perhaps be somewhat undercoloured—not a very serious point, however.

There are small matters on which we think information, when attainable, might have been added, such as the elevations between which mountain species occur (which is only rarely mentioned) and the latitudes at which Arctic species have been found.

As we may reasonably assume that the increase of our knowledge of moths will be still more rapid in the future than it has been in the past, we can hardly expect Sir George Hampson to complete the Noctuidæ in less than ten or twelve volumes. At a rough estimate it is probable that out of the 1139 species described in vol. iv. less than 300 may have been included in Walker's catalogue of 1856–1866. Rather more than 100 species of Agrotinæ have been described by Sir George himself, either for the first time in the present volume, or in previous publications.

Proceedings of the London Mathematical Society. Vol. xxxv. Pp. 476. (London: Francis Hodgson, 1903.)

A SPECIAL interest attaches to the present volume from the fact that it marks the retirement from the secretaryship of Mr. R. Tucker after thirty-five years of office. Mr. Tucker was elected a member of the Society on October 16, 1865, and two years later he succeeded G. C. de Morgan as secretary. Mr. Tucker has been responsible for the greater part of the editorial duties connected with the issue of the *Proceedings* from part xii. onwards, and he has succeeded in producing a series of English mathematical transactions of which he may well feel proud.

Among the subjects treated in this volume we note Dr. Hobson's presidential address on the infinite and the infinitesimal in mathematical analysis, and papers by Mr. Conway on light propagation in a uniaxial crystal, by Prof. A. C. Dixon on summation of series and expansion of functions, by Prof. Hill on power series, by Prof. Lamb on wave motions, by M. Picard on existence theorems for differential equations (in French), by Mr. Whittaker on harmonic analyses, by Mr. W. H. Young on sets of points and intervals, and many other papers of equal interest.

Insist on Yourself. The only Law of Success. Pp 45. (London: Gay and Bird, n.d.) Price 1*s.* net.

THIS little book is intended to set forth concisely many of Emerson's utterances on the importance and power of individuality. The "thoughts" selected are attractively arranged and nicely printed.

LETTERS TO THE EDITOR.

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The Unusual Sky Colours and the Atmospheric Circulation.

PROF. F. A. FOREL writes me concerning my letter in vol. lxviii. p. 623, that although he did not himself observe the coloured ring around the sun prior to the first of last August, yet he has been informed that it was seen in Europe much earlier. The observers and dates quoted by M. Forel, arranged by localities from north to south, are as follows:—Director Rykatcheff, of the Central Physical Observatory at St. Petersburg, noted an opalescent veil surrounding the sun on October 5 and November 9, 1902, January 21, February 10, 18 and 23, March 17, April 5, May 29, and July 26, 1903. Dr. Busch, at Arnsberg, Westphalia, saw the same thing on November 19, 1902, March 21 and 22, 1903, and Prof. Wolf, at Heidelberg, during January, 1903. Dr. Maurer, at Zurich, observed the ring also in January, on March 27 and 28, June 7, 8, 9, and at the end of July, 1903. Therefore, M. Forel says, very properly, that since the phenomenon was observed practically simultaneously in Europe and America, no hypothesis as to why it appeared first in the last named country is needed. While admitting the truth of the statement, I would remark that a faint whitish ring around the sun was recorded by me here as early as June 26, 1902, although it was not noticed again until the close of the year. The equally early appearance over southern England of a large brownish corona, which became smaller but more conspicuous during the summer and autumn of 1902, is described by Mr. T. W. Backhouse in NATURE (vol. lxvii. p. 174).

M. Forel pointed out in the *Comptes rendus* of the French Academy of Sciences for August 10 that in view of the intermittent character of the brilliant colours of the western sky after sunset during the preceding year, produced, he assumed, by the breaking up of the continuous ring of volcanic dust into separate cloud masses which passed successively over Europe, it became of interest to ascertain whether the present Bishop's ring, unlike its predecessor, was always visible in favourable circumstances. The data mentioned, as subsequently sent M. Forel, proved that the new Bishop's ring was visible only at irregular intervals, as he had surmised. Now, if this phenomenon, as well as the discontinuous sunset glows, were caused by the passage of isolated masses of volcanic dust, it seems possible, by comparisons with observations at distant stations, not only to trace the direction of their drift, but also to determine their approximate velocity. Accordingly, the records at Blue Hill of the occurrence of Bishop's ring and of abnormal glows after sunset during the past year were examined, and the tendency of both phenomena to occur intermittently, but not necessarily simultaneously, was established, even though the transparency of air remained nearly constant.

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On comparing these days with those on which Bishop's ring was stated to have been visible at Zurich, and with the dates, from M. Forel's paper, of abnormal sunset glows seen at Morges, it was found that the successive appearances of the respective phenomena occurred here about twenty days later than they did in Switzerland. Of course, the weather conditions at single stations introduce irregularities, so that the conclusion must be regarded as uncertain, but supposing it to be approximately correct, since the stations used lie nearly in the same latitude, and we can assume that the drift of the elevated dust-clouds was from west to east, their velocity in passing around the globe, from central Europe to the eastern United States, was about 30 miles per hour, or a rate considerably less than that found from trigonometrical measurements to be the velocity of the highest ice-clouds.

In the case of the great Krakatoa eruption in 1883, the speed of the ash-cloud as it circled the globe from east to west along the equator, and its slow diffusion toward the poles, was determined from the observation of the successive appearances of coloured suns and brilliant sunset glows in different parts of the world, collected by the Royal Society's committee appointed in 1884. The assistance in solving the problem of atmospheric circulation which a knowledge of the drift of dust ejected into the upper atmosphere by volcanoes situated in the tropics might furnish would certainly justify obtaining all available data bearing on the march of the abnormal sky colours. Mr. Clayton, of this observatory, began the collection of such data some time ago, but was deterred from continuing the work by reason of the difficulty in obtaining definite information. A task of such magnitude belongs properly to a commission possessing the necessary facilities for collecting and discussing the material, so it is hoped that an organisation like the Krakatoa Committee, the admirable report of which was published in 1887, may undertake the study of the recent and present remarkable sky colorations, probably occasioned by the eruptions in 1902 of the volcanoes in Martinique and St. Vincent.

A. LAWRENCE ROTCH.
Blue Hill Meteorological Observatory, Hyde Park, Mass., U.S.A., December 11.

Internal Oscillation in the Waters of Loch Ness.

I WOULD beg a little space in your columns to direct attention to some of the conclusions which I draw from temperature observations taken last summer in Loch Ness.

Routine observations have been taken at the south-west end of the loch several times a day since the middle of July, and I find that the temperature at any depth between 100 and 300 feet changes with time in a markedly periodic fashion, the duration of a period being approximately three days. At about 200 feet the difference between a maximum and a minimum is something like 5° F. At greater depths the temperature change is less, but of the same period and the same phase. At depths less than 200 feet also the temperature change appears to fall off in magnitude whilst retaining the same period and phase, but here there appear to be other changes more or less obscuring the simple periodic variation. Diagram 1 gives a few observations at 200 feet.

I conclude from these observations, and others taken at different parts of the loch, that there is an internal oscillation in the waters—an internal seiche, similar to the swinging which may be set up in the interface between oil and water lying the one above the other in a trough. For such a motion we require liquids of different density lying one above the other; in the loch the upper waters being warmer are lighter than the lower strata, and I think it probable that the region where the temperature changes most abruptly acts as a surface of separation, and is comparable with the interface between the oil and water in the simple arrangement just mentioned. In Diagram 2 I have tried to illustrate the motion. The shaded portion is intended to represent the warmer water, and the hard line the region where the temperature changes most abruptly. Rough calculations on the assumption that the swinging is of this nature give the period of the order observed. A very remarkable point is the large amplitude of the vibration. At the ends of the loch the isothermal surfaces suffering the greatest displacement may move through as much as 75 feet.

The observations make it probable that this swinging is started by gales and strong winds. Winds produce a slope of the upper isotherms down towards the lee end of the loch, and the stronger the wind the deeper is this effect felt. So that strong winds are able to displace the relatively deep

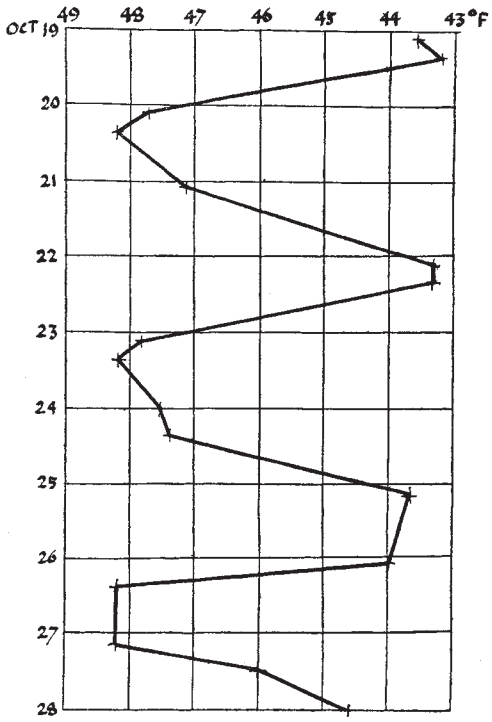

FIG. 1.

isotherms in that region where they act as an interface, and on the wind falling the isotherms swing back and continue to swing freely with a natural period.

Unfortunately it is necessary to wait for the return of summer before more observations can be made bearing on the subject, as the waters are now of almost uniform temperature.

I believe I am right in saying that such a phenomenon had up to this never been even suspected by limnologists.

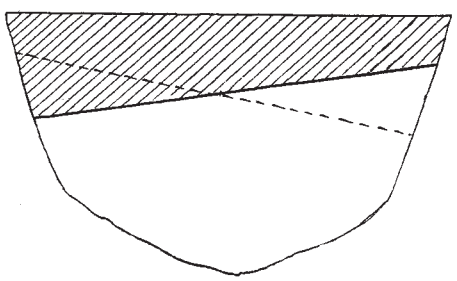

FIG. 2.

I do not think the temperatures of the deeper strata of water in any lake have been systematically observed. The phenomenon seems to me of great interest and worthy of careful study, as it appears to rank in importance along with the ordinary seiches which have been studied with such care and perseverance by Forel and others.

E. R. WATSON.
Scottish Lake Survey, Fort Augustus, N.B., December 12.

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